the text in the descriptions of the plates, which are of material assistance. In short, the third edition exhibits throughout the same careful attention to detail as its predecessors, and the work fully maintains its position as the most valuable handbook to the practical use of the microscope as an optical instrument.

Oil-Finding: An Introduction to the Geological Study of Petroleum. By E. H. Cunningham Craig. Second edition. Pp. xi + 324 + xiii plates. (London: Edward Arnold, 1920.) Price 16*s*. net.

THE second edition of this work has been enlarged to nearly double the bulk of the first, the scheme remaining the same, and there is little to add to the review which appeared in NATURE of August 8, 1912, except to say that the revision of the work has distinctly improved its quality. The author is still insistent on the importance of the theory of the origin of petroleum, and for him that of vegetable origin and subsequent concentration, controlled by geological structure, is supreme. The treatment of this subject, regarded as of vital importance, is inadequate, in so far that less than six pages are devoted to theories of inorganic origin, and thirty-four to a polemical examination of the hypotheses of animal or vegetable origin; yet there are many facts in the known distribution of petroleum more easily explicable on the supposition of inorganic than on that of organic origin. At present there are grave difficulties in the way of regarding either as even approximately complete, and there is this to be said for the theory and principles of application advocated by the author, that they will lead to correct conclusions in about nine cases out of ten, and in the tenth success will depend mainly on luck, instinct, or intuition. The chapters on field-work are very distinctly improved, the approximate and imperfect methods indicated being relegated to their proper place, as expedients which may have to be resorted to by force of circumstances, and not, as inexperienced readers of the first edition might easily be led to believe, preferable to more exact and thorough methods.

Keys to the Orders of Insects. By Frank Balfour-Browne. Pp. vii + 58. (Cambridge: At the University Press, 1920.) Price 7*s*. 6*d*. net.

MR. BALFOUR-BROWNE has placed students under an obligation by publishing this useful series of tables, founded on notes drawn up for those who have the advantage of attending his courses of entomology at Cambridge. The twenty orders of insects recognised are first distinguished by means of a "key," and then the families of those six orders that may be regarded as of greatest economic importance—the Orthoptera, Rhynchota, Lepidoptera, Coleoptera, Diptera, and Hymenoptera—are further discriminated. The characters given are those of adults only; but in later editions the author proposes to deal with some of the larval forms. It is to be hoped that these tables will serve to familiarise the rising generation of entomologists with the Comstock system of nomenclature for wing nervuration, and to hasten its use—perhaps with the modifications rendered necessary by Dr. Tillyard's recent researches—among special students of all orders of insects. Some points of detail in the tables need correction. It is implied that all Thysanura have the jaws retracted within the head; this is not the case with the two most conspicuous families, Machilidæ and Lepismidæ. Palps are not present in the Anoplura and Rhynchota; probably "absent" was meant, but "present" has been printed. In a new edition it would be well, if possible, to break up the unnatural group "Polymorpha" among the beetles, and it is to be hoped that the sale of the book may enable the publishers to reduce the price, which must be considered high, although blank interleaved pages have been considerately provided for students' notes.

G. H. C.

Catalogue of the Lepidoptera Phalaenae in the British Museum. Supplement. Vol. ii.: *Catalogue of the Lithosiadae (Arctianae) and Phalaenoididae in the Collection of the British Museum.* By Sir George F. Hampson. Plates xlii–lxxi. (London: British Museum (Natural History), 1920.) Price 32*s*. 6*d*.

THE present volume is supplementary to vol. iii. of the great Catalogue of Lepidoptera Phalænæ. Owing to the European War it has remained in manuscript since 1915, but has been brought up to date so far as possible. It includes no references to German publications which have appeared since August, 1914, for the reason just mentioned. Two families of Lepidoptera are dealt with—the Lithosiadæ (Arctianæ) and the Phalænoididæ. Of the former, vol. iii. included 147 genera and 845 species, and to these are added in the present work twenty-five genera and no fewer than 1215 species. Of the second family (Agaristidæ of many authors), the original numbers are increased by seven genera and eighty species. In his selection of family and generic names Sir George Hampson has adopted views on nomenclature which have been largely rejected by most systematists, but he has wisely adhered to the system utilised in the already issued volumes. We need only add that the book is well printed and up to the standard of the previous parts of the catalogue.

Historical Geography of Britain and the British Empire. (In two books.) Book I. *The Making of England; The Making of Empire; The Establishment of Empire:* B.C. 55 *to* A.D. 1815. By T. Franklin. Pp. viii + 216. (Edinburgh: W. and A. K. Johnston, Ltd.; London: Macmillan and Co., Ltd., n.d.) Price 2*s*. net.

BOOK I. is divided into three sections; the first deals with the growth of England from the time of the Roman invasion to the beginning of the sixteenth century, the second with the building-up of the British Empire during the two succeeding

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centuries, and the third with the establishment and consolidation of the Empire. Geography plays a minor part in the book, and the title is therefore likely to be misleading. Nevertheless it is refreshing to find a school history in which the author has departed from the time-honoured custom of subdividing his work according to the number of monarchs with whom he intends to deal.

Letters to the Editor.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

"*Spiranthes autumnalis*" in Scotland.

GREAT is the debt which British botanists—experts and amateurs alike—owe to the authors of the "Handbook of the British Flora." It is scarcely possible to imagine a simpler or more convenient key to the natural orders. But a good deal has been added to our knowledge of British plants since the last revision of the work by Sir Joseph Hooker forty years ago, and it is to be regretted that before the latest edition was published in 1918 it was not passed through the hands of a competent editor to bring the work up to date. For instance, it is stated that the little orchid, *Spiranthes autumnalis*, is found nowhere north of Yorkshire and Westmorland. I had always accepted this as gospel until last August, when, while exploring a wood on Speyside for *Linnaea borealis*, I came upon a little colony of "lady's tresses." Since then I have received trustworthy information that Spiranthes grows in the valley of the Nairn.

I do not know whether this addition to our Scottish flora has been recorded hitherto.

HERBERT MAXWELL.

Monreith.

Associated Squares and Derived Simple Squares of Order 5.

THE six different types shown below are distinguished by the position of the complementary numbers (1, 25; 2, 24; 3, 23, etc.):

A

25	10	3	9	18
11	20	5	22	7
2	14	13	12	24
19	4	21	6	15
8	17	23	16	1

B

20	11	5	22	7
10	25	3	9	18
14	2	13	12	24
4	19	21	6	15
17	8	23	16	1

C

6	4	21	19	15
22	20	5	11	7
12	14	13	2	24
9	10	3	25	18
16	17	23	8	1

D

25	18	3	9	10
11	7	5	22	20
2	24	13	12	14
8	1	23	16	17
19	15	21	6	4

E

25	18	3	10	9
11	7	5	20	22
2	24	13	14	12
19	15	21	4	6
8	1	23	17	16

F

25	10	3	18	9
19	4	21	15	6
2	14	13	24	12
11	20	5	7	22
8	17	23	1	16

Constant 65.

A is an associated square, and by means of Dr. Planck's method of complementary differences it has been found that there are 3034 squares of this type, and each one can have sixteen inversions, making a total of 48,544 squares.

B. By exchanging the first and second numbers in both rows and columns of A, type B is obtained. There are thus 48,544 squares of type B.

C. By exchanging the first and fourth numbers in both rows and columns of A, type C is obtained. There are thus 48,544 squares of type C.

D. Every associated square cannot be converted into type D, but by means of Dr. Planck's method of complementary differences the number can be found. It is 972, and each one can have one inversion, making a total of 1944.

E. But 36 of these 972 can be converted into type E, and each one can have three inversions, making a total of 144.

F. Also the same 36 of type D can be converted into type F, and each one, again, can have three inversions, making a total of 144.

In the last three types, squares can be constructed for each type by taking the columns as the rows and *vice versa*, and I have included these in the totals. This obviates the necessity of including types of squares when these three types are turned round through a quarter of a circle.

Totals:

A	...	48,544
B	...	48,544
C	...	48,544
D	...	1,944
E	...	144
F	...	144
		147,864

These are only six out of thirty-four types of 5th order, making a total of nearly 700,000 squares.

J. C. BURNETT.

Barkston, near Grantham, Lincs.

The Spectrum of Nova Cygni III.

CLOUDY and hazy nights have seriously interfered with spectroscopic observations of this nova at Stonyhurst, but some good photographs of the spectrum were obtained with the Whitelow short-focus prismatic camera on the nights of August 29 and 30 and September 6 by Father J. Rowland. The spectrum, the bright band spectrum characteristic of the second stage in the progressive spectra of novæ, remained practically the same during that interval. The bright hydrogen bands extended, on the average, over 20 Å. units, and consisted each of two components. There was a bright extension on the violet edge of H_ζ, about λ 3870, which was possibly the first sign of the incoming of the nebular band.

Besides hydrogen, the most prominent radiations were due to enhanced iron lines, 5316, 5169, 5019, and 4924. On September 6, 4924 alone of the four radiations named left an impression on an isochromatic plate. Between H_β and H_γ were two prominent and very broad bright bands, the first extending from λ 4703 to 4628, and the other marked by three maxima corresponding to the iron lines λ 4584, 4550, and 4516. Between H_γ and H_δ were three very prominent radiations, λ 4303 iron, 4228, and 4170, the last being almost as intense as H_δ. The K calcium band was also doubled, and extended over about 15 Å. units. On August 29 the spectrum extended far into the violet. On September 6 the visual magnitude was estimated as lower than the fifth. No obvious change in the spectrum could be detected on a weak impression secured on September 10. The iron line 4924 was still present. H_α was very brilliant.

A. L. CORTIE.

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